

REMARKS

In accordance with the foregoing, the specification, claim 1, and Figs. 1-3, 4A-4B, and 5 have been amended. Claims 1-4 and 7-26 are pending and under consideration, with claim 1 being independent. No new matter is presented in this amendment.

The specification has been amended to be consistent with the changes made to Figs. 4A-4B and 5 which are discussed below. No new matter has been added to the specification.

Claim 1 has been amended solely to improve its form by changing "heat resistant" (without a hyphen) to "heat-resistant" (with a hyphen) at two places. It is submitted that these changes do not add any new limitations to claim 1 or claims 2-4 and 7-26 depending therefrom, such that the Examiner cannot make the next Office Action final if it includes any new ground of rejection of any of claims 1-4 and 7-26.

Objections to the Drawings

The drawings were objected to because the Examiner is of the opinion that the reflective layer is not clearly illustrated in amended Figs. 4A and 5 filed with the amendment of December 8, 2004, for the reasons set forth on page 2 of the Office Action of June 22, 2005.

Accordingly, Figs. 4A-4B and 5 have been amended to show a clear cross-sectional view of reflective layer 47 interposed between cover heater 43 and heat-resistant layer 46, and a clear cross-sectional view of reflective layer 59 interposed between body heater 53 and heat-resistant layer 56. These changes to Figs. 4A-4B and 5 are supported by the specification as originally filed.

The drawings were objected to because the Examiner considers the straight cross hatching marks in the drawings to represent a metallic material which the Examiner considers to be incorrect because the Examiner considers certain elements to be made of a ceramic material. The Examiner has suggested that proper cross hatching marks be used to reflect the types of material that the reflective layer, the crucible cover, and the crucible body are made of.

The Examiner is presumably referring to the cross hatching symbols indicating various materials on pages 600-99 and 600-100 in Section IX of MPEP 608.02 (Eighth Edition, Revision 2, May 2004), which states as follows in pertinent part (emphasis by underlining added):

The following symbols should be used to indicate various materials where the material is an important feature of the invention. The use of conventional features is very helpful in making prior art searches.

It is submitted that the phrase "should be used" in this passage means that the use of such symbols is not required. The applicants have reviewed the symbols on pages 600-99 and 600-100 of the MPEP, and did not find any symbols suitable for representing all of the various types of materials used in the present invention. Accordingly, Figs. 1-3, 4A-4B, and 5 have been amended to simply delete the straight cross hatching marks referred to by the Examiner.

No new matter has been added to Figs. 1-3, 4A-4B, and 5.

For the reasons discussed above, it is respectfully requested that the objection to the drawings be withdrawn.

Claim Rejections Under 35 USC 103

Claims 1-2, 4, 7, 9, 11-13, 16-18, and 20-25

Claims 1-2, 4, 7, 9, 11-13, 16-18, and 20-25 were rejected under 35 USC 103(a) as being unpatentable over Chow (U.S. Patent No. 5,157,240) in view of either Chandler (U.S. Patent No. 2,799,764) or Isaacson et al. (Isaacson) (U.S. Patent No. 3,842,241). This rejection is respectfully traversed.

Claims 1 and 23-24

The Examiner considers Chow to disclose a heat-resistant layer formed on a surface of the cover heater as recited in independent claim 1. However, the Examiner did not identify which element of Chow's device allegedly corresponds to the heat-resistant layer recited in claim 1, making it difficult to respond to the rejection. Nevertheless, it appears that the Examiner considers protective layer 25' of cover 11 shown in Figs. 2 and 4 of Chow and protective layer 25" of cover 11' shown in Fig. 7 of Chow to correspond to the heat-resistant layer recited in claim 1.

The purpose of protective layer 25' of cover 11 shown in Figs. 2 and 4 of Chow and protective layer 25" of cover 11' shown in Fig. 7 of Chow is to prevent the cover heater from

being exposed directly to a substrate on which thin films are being deposited as described in column 6, lines 29-35, of Chow which reads as follows:

Also, the covering of heating elements 22' and 24' by protective layer 25' keeps them from being exposed directly to the substrate on which thin films are being deposited. This avoids the incorporation into the films being deposited of contaminants arising from the heating of these heating elements.

It appears from this passage that the protective effect provided by Chow's protective layers 25' and 25" that cover the cover heater is the same as the protective effect provided by Chow's protective layer 25 that covers the body heater as shown in Figs. 1-3 and 7 of Chow. This protective effect is described in column 4, line 60, through column 5, line 3, of Chow which reads as follows:

All of this structure on the outer side of shell 20 is then finally covered by a protective layer, 25, of pyrolytic boron nitride, again deposited using a well known chemical vapor deposition process to a thickness of 1.0 to a few mils. Protective layer 25 prevents outer conductor 24 therebeneath from adsorbing gaseous impurities when out in the open which could later outgas at the crucible operating temperatures. Further, the pyrolytic graphite in outer heater 24, in the absence of protective layer 25, may react with residual molecules occurring thereabout even after a hard vacuum has been pulled therein.

As described in column 5, lines 46-48, Chow's protective layers 25' and 25", like Chow's protective layer 25, are made of pyrolytic boron nitride, and presumably Chow's protective layers 25' and 25" are substantially the same thickness as Chow's protective layer 25, i.e., 1.0 to a few mils thick.

It is submitted that nothing whatsoever in the portions of Chow discussed above or in any other portion of Chow indicates that Chow's protective layers 25' and 25" made of pyrolytic boron nitride 1.0 to a few mils thick are capable of acting as a heat-resistant layer as recited in claim 1. Accordingly, it is submitted that Chow does not disclose a heat-resistant layer formed on a surface of the cover heater as recited in claim 1 as alleged by the Examiner. Nor is it seen where this feature of claim 1 is suggested by Chow, or is disclosed or suggested by Chandler and Isaacson.

The Examiner took the same position with respect to the heat-resistant layer recited in claim 1 in the Office Action of March 1, 2005, and arguments traversing the Examiner's position

similar to the arguments presented above were presented on pages 5-6 of the amendment of May 27, 2005. However, the Examiner did not respond to these arguments in the Office Action of June 22, 2005.

The Examiner also considers Chow to disclose a heat-resistant layer on the surface of the body heater as recited in claim 23. However, the Examiner did not identify which element of Chow's device allegedly corresponds to the heat-resistant layer recited in claim 23, making it difficult to respond to the rejection. Nevertheless, it appears that the Examiner considers protective layer 25 that covers the body heater as shown in Figs. 1-3 and 7 of Chow to correspond to the heat-resistant layer recited in claim 23.

The feature a heat-resistant layer on the surface of the body heater recited in claim 23 is similar to the feature a heat-resistant layer formed on a surface of the cover heater recited in claim 1. However, for at least the reasons discussed above in connection with this feature of claim 1, it is submitted that Chow, Chandler, and Isaacson do not disclose a heat-resistant layer on the surface of the body heater as recited in claim 23 as alleged by the Examiner. Nor is it seen where this feature of claim 23 is suggested by Chow, or is disclosed or suggested by Chandler and Isaacson.

As recognized by the Examiner, Chow does not disclose a reflective layer between the cover heater and the heat-resistant layer as recited in claim 1. However, the Examiner considers either Chandler or Isaacson to disclose such a reflective layer, and is of the opinion that it would have been obvious to incorporate such a reflective layer into Chow's cover "to reflect the heat generated by the heater toward an intended heating direction".

However, it is not seen where Chow's cover suffers from any problems which would be solved by incorporating Chandler's or Isaacson's reflective layer into Chow's cover as proposed by the Examiner. For example, column 6, lines 3-6, of Chow states as follows:

The use of cover 11 reduces radiation loss from the opening of crucible 10 considerably to thereby keep the beam-forming material inside crucible 10 much closer to being at a constant temperature everywhere.

Also, column 6, lines 23-29, of Chow states as follows:

Inner heating element 22' and outer heating element 24' provided independently on cover 11 permit cover 11 to be operated at different, and particularly, at higher temperatures than crucible 10. Such higher temperatures in cover 11 prevent

condensation of the beam-forming material effusing at apertures 19 which can easily cause undesirable changes in the beam flux.

As can be seen from these passages, Chow's cover provides certain advantages desired by Chow without using a reflective layer of the type disclosed by Chandler or Isaacson. Furthermore, it is not seen where Chow explicitly or implicitly discloses any problems which might arguably be solved by incorporating Chandler's or Isaacson's reflective layer into Chow's cover as proposed by the Examiner. Nor did the Examiner identify any such problems in explaining the rejection. Accordingly, it is submitted that the only suggestion that this be done is contained in the applicants' disclosure, which the Examiner is prohibited from relying on in a rejection for obviousness by MPEP 2143 which reads as follows (emphasis by underlining added):

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. (Citation omitted.)

Since it appears that the Examiner has impermissibly relied on the applicants' disclosure for the motivation to incorporate Chandler's or Isaacson's reflective layer into Chow's cover, it is submitted that the Examiner has not established a *prima facie* case of obviousness with respect to a reflective layer between the cover heater and the heat-resistant layer as recited in claim 1. Accordingly, it is submitted that Chow, Chandler, and Isaacson do not disclose or suggest a reflective layer between the cover heater and the heat-resistant layer as recited in claim 1

As recognized by the Examiner, Chow does not disclose a reflective layer between the body heater and the heat-resistant layer as recited in claim 24. However, the Examiner considers either Chandler or Isaacson to disclose such a reflective layer, and is of the opinion that it would have been obvious to incorporate such a reflective layer into Chow's main body "to reflect the heat generated by the heater toward an intended heating direction".

The feature a reflective layer between the body heater and the heat-resistant layer recited in claim 24 is similar to the feature a reflective layer between the cover heater and the heat-resistant layer recited in claim 1. However, for at least the reasons discussed above in connection with this feature of claim 1, it is submitted that Chow, Chandler, and Isaacson do not disclose or suggest a reflective layer between the body heater and the heat-resistant layer as recited in claim 24.

For at least the reasons discussed above, it is submitted that Chow, Chandler, and Isaacson do not disclose or suggest a heat-resistant layer formed on a surface of the cover heater and a reflective layer between the cover heater and the heat-resistant layer as recited in claim 1, or a heat-resistant layer on the surface of the body heater recited in claim 23, or a reflective layer between the body heater and the heat-resistant layer as recited in claim 24. Accordingly, it is submitted that claims 1 and 23-24 patentably distinguish over Chow, Chandler, and Isaacson in the sense of 35 USC 103(a), and it is respectfully requested that the rejection of claims 1 and 23-24 under 35 USC 103(a) as being unpatentable over Chow in view of either Chandler or Isaacson be withdrawn.

Claims 2 and 18

The Examiner considers Chow to disclose the feature of claim 2 wherein the cover heater is formed as a single wire pattern laid over the entire top surface of the cover, the single wire pattern having a positive and a negative terminal at respective ends of the single wire pattern. However, it is submitted that Chow does not disclose this feature of claim 2 as alleged by the Examiner because the cover heaters in all of the embodiments disclosed by Chow are formed as two patterns, rather than a single wire pattern as recited in claim 2.

See inner heating element 22' and outer heating element 24' in Figs. 2 and 4 of Chow which show more detailed views of cover 11 in Fig. 1 of Chow, and inner heating element 22" and outer heating element 24" in cover 11' in Fig. 7 of Chow.

Accordingly, it is submitted that Chow does not disclose the feature of claim 2 wherein the cover heater is formed as a single wire pattern laid over the entire top surface of the cover, the single wire pattern having a positive and a negative terminal at respective ends of the single wire pattern, as alleged by the Examiner.

Nor is it seen where this feature of claim 2 is suggested by Chow or is disclosed or suggested by Chandler or Isaacson in light of column 7, lines 6-10, of Chow which states that multiple heating elements in the cover provide very good temperature uniformity and reads as follows:

If apertures 19 are omitted, cover 11 can alternatively [sic] serve as a flat heater for heating substrates upon which material depositions are to be made. The multiple heating elements 22' and 24' will provide very good temperature uniformity across such a structure.

The Examiner also considers Chow to disclose the feature of claim 18 wherein the body heater is formed as a single wire pattern laid over the entire outer wall of the main body, the single wire pattern having a positive and a negative terminal at respective ends of the single wire pattern. However, it is submitted that Chow does not disclose this feature of claim 18 as alleged by the Examiner because the body heaters in all of the embodiments disclosed by Chow are formed as two patterns, rather than a single wire pattern as recited in claim 18.

See first layer heating element 22 and second layer heating element 24 in Figs. 1-3 and 7 of Chow.

Accordingly, it is submitted that Chow does not disclose the feature of claim 18 wherein the body heater is formed as a single wire pattern laid over the entire outer wall of the main body, the single wire pattern having a positive and a negative terminal at respective ends of the single wire pattern, as alleged by the Examiner. Nor is it seen where this feature of claim 18 is suggested by Chow, or is disclosed or suggested by Chandler and Isaacson.

For at least the reasons discussed above, it is submitted that Chow, Chandler, and Isaacson do not disclose or suggest the feature of claim 2 wherein the cover heater is formed as a single wire pattern laid over the entire top surface of the cover, the single wire pattern having a positive and a negative terminal at respective ends of the single wire pattern, or the feature of claim 18 wherein the body heater is formed as a single wire pattern laid over the entire outer wall of the main body, the single wire pattern having a positive and a negative terminal at respective ends of the single wire pattern, as alleged by the Examiner. Accordingly, it is submitted that claims 2 and 18 patentably distinguish over Chow, Chandler, and Isaacson in the sense of 35 USC 103(a), and it is respectfully requested that the rejection of claims 2 and 18 under 35 USC 103(a) as being unpatentable over Chow in view of either Chandler or Isaacson be withdrawn.

Claims 7 and 25

Claim 7 recites that the insulating material forming the cover has a good heat radiation property, and claim 25 recites that the insulating material forming the main body has a good heat radiation property. However, the Examiner did not discuss these features of claims 7 and 25 in explaining the rejection, and it is not seen where these features of claim 7 and 25 are disclosed or suggested by Chow, Chandler, and Isaacson.

Chow discloses that Chow's cover and main body are made of pyrolytic boron nitride, and it is not seen where Chow discloses or suggests that pyrolytic boron nitride has a good heat radiation property as recited in claims 7 and 25. Nor is it seen where this feature of claims 7 and 25 is suggested by Chandler and Isaacson.

For at least the reasons discussed above, it is submitted that Chow, Chandler, and Isaacson do not disclose or suggest the feature of claim 7 wherein the insulating material forming the cover has a good heat radiation property, or the feature of claim 25 wherein the insulating material forming the main body has a good heat radiation property. Accordingly, it is submitted that claims 7 and 25 patentably distinguish over Chow, Chandler, and Isaacson in the sense of 35 USC 103(a), and it is respectfully requested that the rejection of claim 7 and 25 under 35 USC 103(a) as being unpatentable over Chow in view of either Chandler or Isaacson be withdrawn.

Claim 9

As recognized by the Examiner, Chow, Chandler, and Isaacson do not disclose the feature of claim 9 wherein the cover heater is formed in a concentric pattern around the nozzle. However, the Examiner is of the opinion that it would have been obvious to modify Chow's cover heater to have this feature, stating as follows:

With respect to claim 9, Chow shows the cover having a nozzle in the center of the cover with a cover heater provided around the nozzle. However, while, Chow does not show that the cover heater concentric pattern around the nozzle, it would have been obvious to one of ordinary skill in the art to provide the cover heater in the concentric pattern or any other pattern to effectively provide uniform and stable heating across the cover.

However, the Examiner has not identified any motivation whatsoever in Chow, Chandler, and Isaacson for modifying Chow's cover heater to be formed in a concentric pattern around the nozzle as recited in claim 9. Rather, the only suggestion that this be done is contained in the applicants' disclosure, which the Examiner is prohibited from relying on to establish a *prima facie* case of obviousness by MPEP 2143 as discussed above in connection with claim 1.

Furthermore, it is submitted that such a modification would be contrary to the statement in column 7, lines 6-10, of Chow which states that the multiple heating elements in Chow's cover provide very good temperature uniformity and reads as follows:

If apertures 19 are omitted, cover 11 can alternatively [sic] serve as a flat heater for heating substrates upon which material depositions are to be made. The multiple heating elements 22' and 24' will provide very good temperature uniformity across such a structure.

For at least the reasons discussed above, it is submitted that Chow, Chandler, and Isaacson do not disclose or suggest the feature of claim 9 wherein the cover heater is formed in a concentric pattern around the nozzle as alleged by the Examiner. Accordingly, it is submitted that claim 9 patentably distinguishes over Chow, Chandler, and Isaacson in the sense of 35 USC 103(a), and it is respectfully requested that the rejection of claim 9 under 35 USC 103(a) as being unpatentable over Chow in view of either Chandler or Isaacson be withdrawn.

Claim 16

Claim 16 recites that the cover heater is formed as a heating block by spray coating a heat emitting material onto the cover. However, the Examiner did not discuss this feature of claim 16 in explaining the rejection, and it is not seen where this feature is disclosed or suggested in Chow, Chandler, and Isaacson.

Chow's cover heater is apparently formed the same way that Chow's body heater is formed, that is, by depositing pyrolytic graphite by chemical vapor deposition, selectively masking the resulting graphite surface, and etching away the unmasked portions. See column 3, lines 24-33, of Chow which describes the process of forming Chow's body heater.

Chandler's heater 44 shown in Figs. 3-4 of Chandler is described as follows in column 4, lines 18-23, of Chandler:

Affixed to layer 42, or embedded or impregnated therein is a suitable electrically conductive means 44 of sufficient heat dissipative capacity and inherent resistance, to provide a substantial heating effect from current passing therethrough.

Chandler's heater 72 shown in Figs. 5-6 of Chandler is described as follows in column 7, lines 22-30, of Chandler:

Next to the lower surface 70 of the insulating layer 68, is the resistance layer 72 which, like layer 44 of Figures 3 and 7, may be formed of any suitable resistance material as described therefor, including graphite, flake carbon, or carbon dispersion in a fluid medium which is allowed to dry, or other forms as mentioned, or metallic resistance coating also as mentioned, which will generate heat from electrical current passing therethrough,

Chandler's heater 100 shown in Figs. 9 and 11 of Chandler is described as follows in column 8, lines 19-24, of Chandler:

Looking at Figure 9, it is seen that here is another modified form of the inventive idea, in which there is a heat generating heat dissipating element 100 in sheet form, and formed in any manner described herein, either by carbon or metallic particles, or granules or the like, or otherwise, for dissipating heat therefrom on passage of electric current therethrough.

Isaacson's heater element 50 shown in Figs. 2-3 of Isaacson includes a conductive element 51 in the form of a thin metal sheet or a loop of nichrome wire. See column 2, lines 59-61, of Isaacson.

It is submitted that nothing whatsoever in the passages of Chow, Chandler, and Isaacson discussed above or any other portion of Chow, Chandler, and Isaacson discloses or suggests the feature of claim 16 wherein the cover heater is formed as a heating block by spray coating a heat emitting material onto the cover.

For at least the reasons discussed above, it is submitted that Chow, Chandler, and Isaacson do not disclose or suggest the feature of claim 16 wherein the cover heater is formed as a heating block by spray coating a heat emitting material onto the cover. Accordingly, it is submitted that claim 16 patentably distinguishes over Chow, Chandler, and Isaacson in the sense of 35 USC 103(a), and it is respectfully requested that the rejection of claim 16 under 35 USC 103(a) as being unpatentable over Chow in view of either Chandler or Isaacson be withdrawn.

Claim 20

The Examiner considers Chow to disclose the feature of claim 20 wherein the body heater is further formed over the bottom of the main body, although the Examiner did not point out where this feature is disclosed in Chow, making it difficult to respond to the rejection. However, it is submitted that Chow does not disclose or suggest this feature of claim 20 as alleged by the Examiner.

Main body 10 shown in Figs. 1-2 and 7 of Chow is conical in shape, and it is readily apparent from Figs. 1-2 and 7 that the body heater (first layer heating element 22 and second layer heating element 24) is not further formed over the bottom of main body 10 as apparently alleged by the Examiner, but is formed only over the sides of main body 10.

Column 5, lines 14-18, of Chow states as follows:

Although crucible 10 is shown in FIGS. 1 and 2 to be conical-like in shape, other shapes are possible and even made more feasible by the use of thin film heaters deposited directly on the inner or outer walls of the containment vessel.

It is submitted that nothing whatsoever in this portion of Chow or in any other portion of Chow discloses the feature of claim 20 wherein the body heater is further formed over the bottom of the main body as alleged by the Examiner. Nor is it seen where this feature of claim 20 is suggested by Chow, or is disclosed or suggested by Chandler and Chow.

For at least the reasons discussed above, it is submitted that Chow, Chandler, and Isaacson do not disclose or suggest the feature of claim 20 wherein the body heater is further formed over the bottom of the main body. Accordingly, it is submitted that claim 20 patentably distinguishes over Chow, Chandler, and Isaacson in the sense of 35 USC 103(a), and it is respectfully requested that the rejection of claim 20 under 35 USC 103(a) as being unpatentable over Chow in view of either Chandler or Isaacson be withdrawn.

Claims 4, 11-13, 17, and 21-22

Notwithstanding the position taken by the Examiner, it is noted that claims 4, 11-13, 17, and 21-22 depend directly or indirectly from claim 1, and thus recite all of the features recited in claim 1 together with further features of the present invention. For at least the reasons

discussed above in connection with claim 1, it is submitted that Chow, Chandler, and Isaacson do not disclose or suggest the features of claim 1 which are discussed above and are recited in claims 4, 11-13, 17, and 21-22 by virtue of their dependency from claim 1. Accordingly, it is submitted that claims 4, 11-13, 17, and 21-22 patentably distinguish over Chow, Chandler, and Isaacson in the sense of 35 USC 103(a), and it is respectfully requested that the rejection of claims 4, 11-13, 17, and 21-22 under 35 USC 103(a) as being unpatentable over Chow in view of either Chandler or Isaacson be withdrawn.

Claims 3, 14, and 19

Claims 3, 14, and 19 were rejected under 35 USC 103(a) as being unpatentable over Chow in view of either Chandler or Isaacson as applied to claims 1-2, 4, 7, 9, 11-13, 16-18, and 20-25, and further in view of Kano et al. (Kano) (U.S. Patent No. 6,242,719). This rejection is respectfully traversed.

Claims 3 and 19

As recognized by the Examiner, Chow, Chandler, and Isaacson do not disclose or suggest the feature of claim 3 wherein the single wire pattern of the cover heater is formed of platinum by printing, or the feature of claim 19 wherein the single wire pattern of the body heater is formed of platinum by printing. However, the Examiner considers these features of claims 3 and 19 to be disclosed by Kano, and is of the opinion that it would have been obvious to incorporate these features into Chow's device "to adapt Chow, as modified by Chandler or Isaacson, with the cover heater made of platinum as an alternative conductive material that can alternatively provide stable and uniform heating temperature".

Although the Examiner did not identify any particular portion of Kano as support for the rejection, it appears that the Examiner is relying on the following passage in column 6, lines 17-24, of Kano:

The heater pattern to be the heat generating layer is preferably composed of carbon (graphite), high melting point metal (iron, copper, nickel, molybdenum, tantalum, tungsten etc.), high melting point metal alloy (Ni—Cr, Fe—Cr, Fe—Cr—Al etc.), noble metal (silver, platinum, rhodium etc.) or noble metal alloy (Pt—Rh etc.),

which are highly heat-resistant and have appropriate electrical resistance.

Although this passage of Kano states that the heater pattern may be formed of platinum as recited in claims 3 and 19, it does not state that the heater pattern is formed of platinum by printing as recited in claims 3 and 19. Nor did the Examiner address the by printing feature of claims 3 and 19 in explaining the rejection.

It is submitted that nothing whatsoever in Kano discloses or suggests that that the heater pattern is formed of platinum by printing as recited in claims 3 and 19. Rather, it appears that the only method Kano discloses for forming the heater pattern is by chemical vapor deposition as described, for example, in column 6, lines 25-35, of Kano which reads as follows:

The support substrate, the heater layer and the protective layer constituting the multiple-layered ceramic heater and the feeding member of the present invention, except for a few metal heat generating layers, are preferably produced by chemical vapor deposition (CVD). The CVD technique provides uniform film thickness and deposited layers of high density and high purity, and affords a heater allowing little leakage current, and offering high temperature increase capability, good temperature controllability of each member, ease of uniform heating, and stable operation over a long period of time.

It is submitted that forming a heater pattern by printing as recited in claims 3 and 19 is, for example, much simpler and less expensive than forming a heater pattern by chemical vapor deposition as disclosed by Kano.

For at least the reasons discussed above, it is submitted that Chow, Chandler, Isaacson, and Kano do not disclose or suggest the feature of claim 3 wherein the single wire pattern of the cover heater is formed of platinum by printing, or the feature of claim 19 wherein the single wire pattern of the body heater is formed of platinum by printing. Accordingly, it is submitted that claims 3 and 19 patentably distinguish over Chow, Chandler, Isaacson, and Kano in the sense of 35 USC 103(a), and it is respectfully requested that the rejection of claims 3 and 19 under 35 USC 103(a) as being unpatentable over Chow in view of either Chandler or Isaacson as applied to claims 1-2, 4, 7, 9, 11-13, 16-18, and 20-25, and further in view of Kano, be withdrawn.

Claim 14

Notwithstanding the position taken by the Examiner, it is noted that claim 14 depends indirectly from claim 1, and thus recites all of the features recited in claim 1 together with further features of the present invention. For at least the reasons discussed above in connection with claim 1, it is submitted that Chow, Chandler, and Isaacson do not disclose or suggest the features of claim 1 which are discussed above and are recited in claim 14 by virtue of its dependency from claim 1. Nor is it seen where these features of claim 1 are disclosed or suggested by Kano. Accordingly, it is submitted that claim 14 patentably distinguishes over Chow, Chandler, Isaacson, and Kano in the sense of 35 USC 103(a), and it is respectfully requested that the rejection of claim 14 under 35 USC 103(a) as being unpatentable over Chow in view of either Chandler or Isaacson as applied to claims 1-2, 4, 7, 9, 11-13, 16-18, and 20-25, and further in view of Kano, be withdrawn.

Claims 8, 15, and 26

Claims 8, 15, and 26 were rejected under 35 USC 103(a) as being unpatentable over Chow in view of either Chandler or Isaacson as applied to claims 1-2, 4, 7, 9, 11-13, 16-18, and 20-25, and further in view of Bichrt (U.S. Patent No. 6,162,300). This rejection is respectfully traversed.

Claim 8

Notwithstanding the position taken by the Examiner, it is noted that claim 8 depends indirectly from claim 1 and directly from claim 7, and thus recites all of the features recited in claims 1 and 7 together with further features of the present invention. For at least the reasons discussed above in connection with claims 1 and 7, it is submitted that Chow, Chandler, and Isaacson do not disclose or suggest the features of claims 1 and 7 which are discussed above and are recited in claim 8 by virtue of its dependency from claims 1 and 7. Nor is it seen where these features of claims 1 and 7 are disclosed or suggested by Bichrt. Accordingly, it is submitted that claim 8 patentably distinguishes over Chow, Chandler, Isaacson, and Bichrt in the sense of 35 USC 103(a), and it is respectfully requested that the rejection of claim 8 under 35 USC 103(a) as being unpatentable over Chow in view of either Chandler or Isaacson as applied to claims 1-2, 4, 7, 9, 11-13, 16-18, and 20-25, and further in view of Bichrt, be withdrawn.

Claim 15

Notwithstanding the position taken by the Examiner, it is noted that claim 15 depends indirectly from claim 1, and thus recites all of the features recited in claim 1 together with further features of the present invention. For at least the reasons discussed above in connection with claim 1, it is submitted that Chow, Chandler, and Isaacson do not disclose or suggest the features of claim 1 which are discussed above and are recited in claim 15 by virtue of its dependency from claim 1. Nor is it seen where these features of claim 1 are disclosed or suggested by Bichrt. Accordingly, it is submitted that claim 15 patentably distinguishes over Chow, Chandler, Isaacson, and Bichrt in the sense of 35 USC 103(a), and it is respectfully requested that the rejection of claim 15 under 35 USC 103(a) as being unpatentable over Chow in view of either Chandler or Isaacson as applied to claims 1-2, 4, 7, 9, 11-13, 16-18, and 20-25, and further in view of Bichrt, be withdrawn.

Claim 26

Notwithstanding the position taken by the Examiner, it is noted that claim 26 depends indirectly from claim 1 and directly from claim 25, and thus recites all of the features recited in claims 1 and 25 together with further features of the present invention. For at least the reasons discussed above in connection with claims 1 and 25, it is submitted that Chow, Chandler, and Isaacson do not disclose or suggest the features of claims 1 and 25 which are discussed above and are recited in claim 26 by virtue of its dependency from claims 1 and 25. Nor is it seen where these features of claims 1 and 25 are disclosed or suggested by Bichrt. Accordingly, it is submitted that claim 26 patentably distinguishes over Chow, Chandler, Isaacson, and Bichrt in the sense of 35 USC 103(a), and it is respectfully requested that the rejection of claim 26 under 35 USC 103(a) as being unpatentable over Chow in view of either Chandler or Isaacson as applied to claims 1-2, 4, 7, 9, 11-13, 16-18, and 20-25, and further in view of Bichrt, be withdrawn.

Claim 10

Claim 10 was rejected under 35 USC 103(a) as being unpatentable over Chow in view of either Chandler or Isaacson as applied to claims 1-2, 4, 7, 9, 11-13, 16-18, and 20-25, and further in view of either Maeda et al. (Maeda) (U.S. Patent No. 5,233,166) or Okuda et al. (Okuda) (U.S. Patent No. 4,804,823). This rejection is respectfully traversed.

As recognized by the Examiner, Chow, Chandler, and Isaacson do not disclose or suggest the features of claim 10 wherein the cover heater is formed by printing a conductive paste on the surface of the cover and sintering the printed conductive paste, wherein the conductive paste comprises metal particles and metal oxide. However, the Examiner considers these features of claim 10 to be disclosed by Maeda and Okuda, and is of the opinion that it would have been obvious to incorporate these features into Chow's device "to adapt Chow, as modified by Chandler or Isaacson, with the cover heater made of conductive paste having the metal particles and metal oxides to form a heating element that can provide a mechanically and thermally stable heater that can also withstand a high temperature".

With respect to Maeda, although the Examiner did not identify any particular portion of Maeda as support for the rejection, the most relevant passage of Maeda appears to be column 5, lines 19-31, of Maeda which reads as follows:

Next, binders and organic solvents were added to the mixture of the above-mentioned inorganic conductor powder and silicon nitride (Si_3N_4) powder which had been adjusted to have the compositions listed in Table 1, and mixed by a vibration mill for 24 hours. A viscosity adjustment solvent was then added to the obtained mixture to adjust the paste for the heating resistor.

By using the paste for the heating resistor obtained as described above, the roughly U-shaped heating resistor pattern 9 and the lead sections 5 were subjected to thick-film printing on the top surface of the above-mentioned crude ceramic plate of silicon nitride 8 by the screen printing method.

However, it is submitted that Maeda does not disclose or suggest the feature of claim 10 wherein the conductive paste comprises metal particles and metal oxide because the only conductive pastes disclosed by Maeda comprise metal carbide particles (WC) or metal nitride particles (TaN or TiN) and metalloid nitride (Si_3N_4) or semimetal nitride (Si_3N_4) as listed in Table 1 in columns 4-5 of Maeda, rather than metal particles and metal oxide as recited in claim 10.

As is well known in the art, silicon is not a metal as recited in claim 10, but is a metalloid or semimetal with properties intermediate between a metal and a nonmetal.

With respect to Okuda, although the Examiner did not identify any particular portion of Okuda as support for the rejection, the most relevant passages of Okuda appear to be column 5, lines 26-30, of Okuda which reads as follows:

The heat-generating generator layer containing TiN is formed of a sintered body of (a) titanium nitride, (b) silicon nitride and (c) a sintering aid. As the sintering aid (c), there are used yttria, magnesia and alumina. An especially preferred example of the ceramic composition comprises 40 to 85% by weight of titanium nitride, 20 to 54% by weight of silicon nitride and 1 to 10% by weight of the sintering aid.

and column 6, line 54, through column 7, line 4, of Okuda which reads as follows:

In accordance with still another embodiment of the present invention, the ceramic substrate is composed of a sintered body of silicon nitride and the heat-generating resistor is composed of a tungsten carbide layer. The heat-generating resistor layer of WC is prepared, for example, by sintering a paste containing WC alone.

In the examples of the present invention, the heat-generating resistor paste comprising substantially pure WC, that is, WC having a purity of 99.8%, was used. However, in order to adjust the resistance value of the heat-generating resistor, improve the denseness of the resistor or enhance the bondability to the silicon nitride substrate, up to about 40% by weight of a single substrate, oxide, nitride, carbide or carbonitride of an element of the group IIIA such as Y or an element of the group IIA such as Mg, or the same Si₃N₄ as that of the silicon nitride substrate, may be added to WC. If such an additive is incorporated, the effects of the present invention are not degraded.

Tables 1, 3-4, and 8 in Okuda disclose various examples of the conductive pastes described in above portions of Okuda.

However, it is submitted that Okuda does not disclose or suggest the feature of claim 10 wherein the conductive paste comprises metal particles and metal oxide because all of the conductive pastes described in the above portions of Okuda and shown in Tables 1, 3-4, and 8 of Okuda comprise metal nitride particles (TiN) or metal carbide particles (WC) and metal oxide (yttria, magnesia, alumina), rather than metal particles and metal oxide as recited in claim 10.

Although Tables 2 and 8 of Okuda disclose conductive pastes that comprise metal particles (Mo or W) as recited in claim 10, these conductive pastes do not comprise metal oxide as recited in claim 10 as can be seen, for example, from column 8, lines 49-51; column 9, lines 67-68; column 13, lines 1-6; and column 15, lines 59-60, of Maeda.

For at least the reasons discussed above, it is submitted that Chow, Chandler, Isaacson, Maeda, and Okuda do not disclose or suggest the feature of claim 10 wherein the conductive paste comprises metal particles and metal oxide. Accordingly, it is submitted that claim 10 patentably distinguishes over Chow, Chandler, Isaacson, Maeda, and Okuda in the sense of 35 USC 103(a), and it is respectfully requested that the rejection of claim 10 under 35 USC 103(a) as being unpatentable over Chow in view of either Chandler or Isaacson as applied to claims 1-2, 4, 7, 9, 11-13, 16-18, and 20-25, and further in view of either Maeda and Okuda, be withdrawn.

Conclusion

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 503333.

Respectfully submitted,

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AMENDMENTS TO THE DRAWINGS:

Four replacement sheets of drawings are attached to this paper and include changes to Figs. 1-3, 4A-4B, and 5. No changes were made to Fig. 4C. The changes to Figs. 1-3, 4A-4B, and 5 are discussed below in the Remarks under "Objection to the Drawings".

The replacement sheet containing Figs. 1-2 replaces the original sheet containing Figs. 1-2 filed with the application on September 2, 2003.

The replacement sheet containing Figs. 3 and 4A replaces the replacement sheet containing Figs. 3 and 4A filed with the amendment of December 8, 2004.

The replacement sheet containing Figs. 4B-4B replaces the original sheet containing Figs. 4B-4C filed with the application on September 2, 2003.

The replacement sheet containing Fig. 5 replaces the replacement sheet containing Fig. 5 filed with the amendment of December 8, 2004.